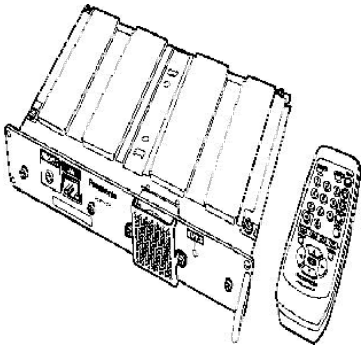
ORDER NO. KMS0508115CE
F5

# Service Manual

## Streaming Box

## BB-S700PDA / BB-S700PDE

(for U.S.A. and Europe)



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**⚠ WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service

**IMPORTANT INFORMATION ABOUT LEAD FREE (PbF), SOLDERING**
**If lead free solder was used in the manufacture of this product the printed circuit boards will be marked PbF.**
**Standard leaded, (Pb), solder can be used as usual on boards without the PbF mark.**

# 1. FOR SERVICE TECHNICIANS

**ICs and LSIs are vulnerable to static electricity.**

**When repairing, the following precautions will help prevent recurring malfunctions.**

## 1. Cover the plastic parts boxes with aluminum foil.

**2. Ground the soldering irons.**

**3. Use a conductive mat on the worktable.**

**4. Do not touch IC or LSI pins with bare fingers.**

# 2. CAUTION

## 2.1. BATTERY CAUTION

**Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's Instructions.**
**The lithium battery is a critical component (type No.CR-2032/BT). Please observe for the proper polarity and the exact location when replacing it and soldering the replacement lithium battery in.**

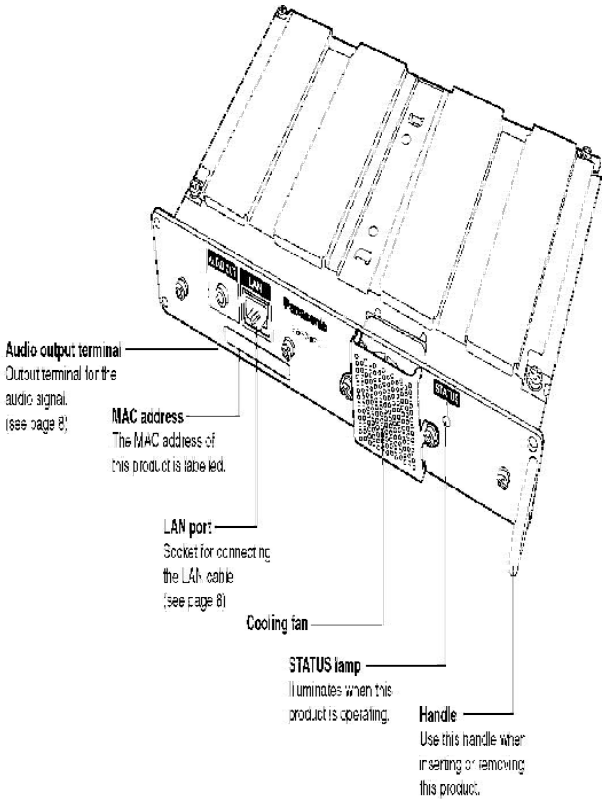
# 3. SPECIFICATION

| Hardware Specifications | | |
|---|---|---|
| Supported plasma displays | | The following Panasonic models<br>TH-37PW5X, TH-42PW5X, TH-42PHD6, TH-50PHD6 |
| Outputs | Network | 10BASE-T/100BASE-TX (RJ-45) |
| | Audio output | Stereo mini jack (ø3.5 mm) output terminals and internal connection cannot be used at same time.) |
| Power consumption | | Maximum: 14 W (0.7 A approx.) |
| Internal clock | | Backed up by internal battery |
| Operating temperature range | | +5 °C to +40 °C (41 °F to 104 °F) |
| Maximum external dimensions | | 209 mm (8.22 inches) x 35 mm (1.49 inches) x 135 mm (5.31 inches) |
| Weight | | 630 g (1.38 lb.) (Only the unit) |
| Hard disk capacity | | 80GB approx. |

**The display fonts used in this product were supplied by Lim Corporation.**

# 4. LOCATIONS

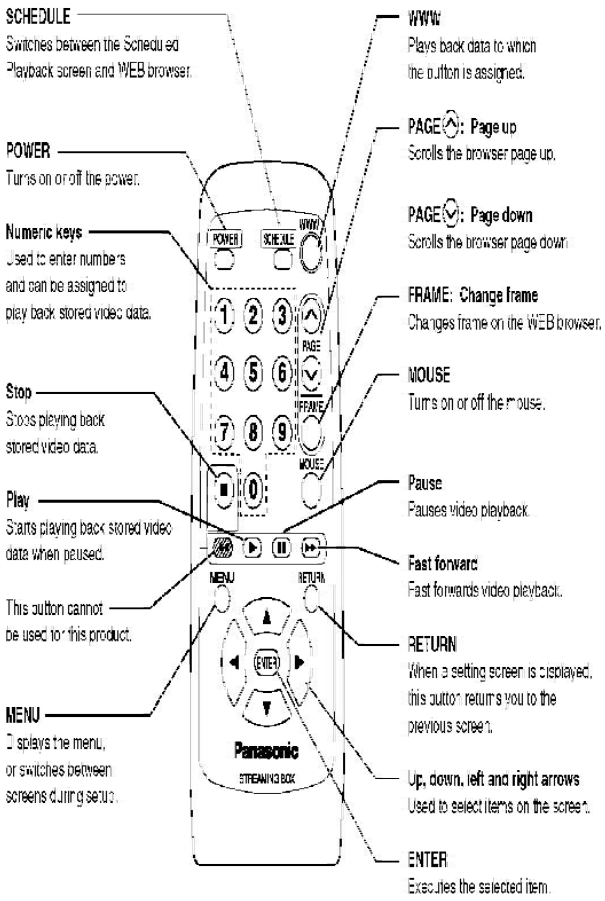
## 4.1. CABLE CONNECTOR PANEL


Audio output terminal
Output terminal for the audio signal.
(see page 8)
MAC address
The MAC address of this product is labeled.
LAN port
Socket for connecting the LAN cable
(see page 8)
Cooling fan
STATUS lamp
Illuminates when this product is operating.
Handle
Use this handle when inserting or removing this product.

## 4.2. PLASMA DISPLAY CONNECTION

## 4.3. REMOTE CONTROL

**The remote control of this product uses the remote control receiver of the plasma display.**
**Use within the range of approximately 7 m (275.59 inches) from the remote control receiver of the plasma display.**


SCHEDULE
Switches between the Scheduled Playback screen and WEB browser.
POWER
Turns on or off the power.
Numeric keys
Used to enter numbers and can be assigned to play back stored video data.
Stop
Stops playing back stored video data.
Play
Starts playing back stored video data when paused.
This button cannot be used for this product.
MENU
Displays the menu, or switches between screens during setup.
WWW
Plays back data to which the button is assigned.
PAGE: Page up
Scrolls the browser page up.
PAGE: Page down
Scrolls the browser page down.
FRAME: Change frame
Changes frame on the WEB browser.
MOUSE
Turns on or off the mouse.
Pause
Pauses video playback.
Fast forward
Fast forwards video playback.
RETURN
When a setting screen is displayed, this button returns you to the previous screen.
Up, down, left and right arrows
Used to select items on the screen.
ENTER
Executes the selected item.
Panasonic
STREAMING BOX

# 5. INSTALLATION

## 5.1. INSTALLING THE PRODUCT

**Important**

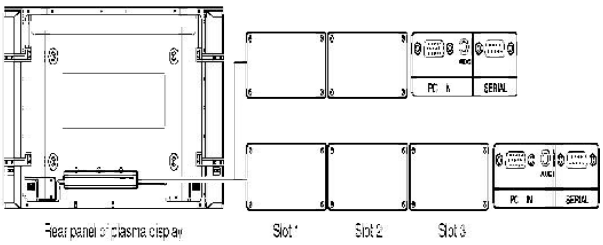
**- When inserting or removing this product, always hold by the handle. Doing so prevents cuts to your hand caused by the solder joints and other sharp projections on the board.**

**- Do not touch any of the connectors or electronic components on this product or plasma display. Doing so may result in damage to electronic components caused by static electricity.**

**- Make a note of the MAC address labelled under the LAN port of this product in the blank on the back cover. The MAC address is required to initialize the password or to add this product to the management server. (see page 4)**

### 5.1.1. Before inserting this product

**Panasonic "6-Series" plasma displays have slots for installing this product. These are located on the rear panel as shown below.**




**This product can only be inserted into slot 1 and slot 2 of a plasma display.**

1. **Turn off the power of the plasma display and any connected equipment.**
2. **Unplug the AC cord from the mains socket and unplug the connector cable from the plasma display.**
3. **Place the plasma display face down on a clean, soft cloth that is free of any dust.**

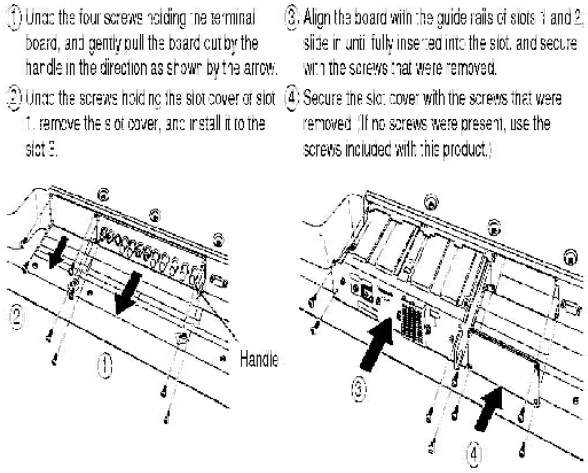
### 5.1.2. Insert this product

1. **Remove the slot covers or terminal board from the plasma display to insert this product.**

    **- Install this product in the slot 1 and slot 2.**

**When slot covers are installed:**

**When a terminal board is installed:**


① Undo the four screws holding the terminal board, and gently pull the board out by the handle in the direction as shown by the arrow.
② Undo the screws holding the slot cover of slot 1, remove the slot cover, and install it to the slot 2.
③ Align the board with the guide rails of slots 1 and 2, slide in until fully inserted into the slot, and secure with the screws that were removed.
④ Secure the slot cover with the screws that were removed. (If no screws were present, use the screws included with this product.)
Handle

*** This aforementioned installation method is for a plasma display with three slots (see page 6). For a plasma display with two slots, remove the terminal board inserted into the slots 1 and 2, and install this product.**

**Important**

**- Securely close the fitting that covers the slot.**

**- Take care not to scratch any of the metal parts on the back cover or display sheet when removing or inserting the terminal board in the plasma display.**

**- Do not touch the plasma display connector on this product.**
**Touching the connector may damage this product components due to static electricity. Similarly, when inserting or removing this product, touch the back panel or other metal part of the plasma display to discharge any static electricity from your body.**

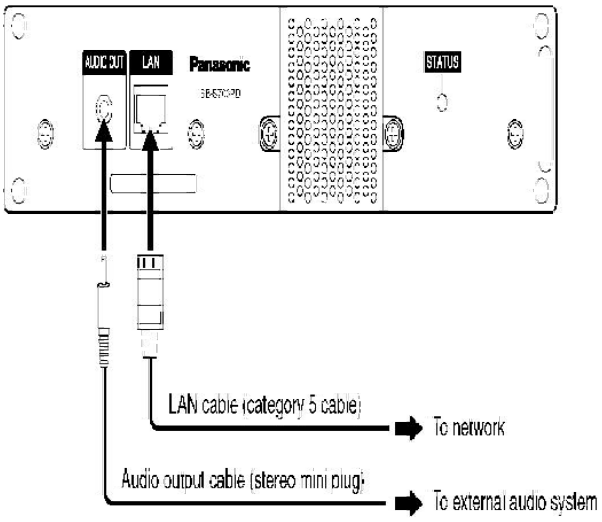
**- Insert this product correctly.**
**When inserting this product into the slots on the plasma display, hold this product level and insert slowly until the connector is securely inserted into the plasma display. Installing this product incorrectly may cause a fault.**

**- Keep the replaced terminal board in a safe place as it is required for repairs or servicing for the plasma display.**

## 5.2. CONNECTING

### 5.2.1. Connecting the LAN cable and output cable

**Plug the LAN cable into the LAN port.**
**Connect the audio output cable when connecting it with an external audio system.**




**Important**

**- Use category 5 cable (approx. 100m max.) for the LAN cable. Using an incorrect cable may result in a fault or bad connection.**

**- Use a cable with an stereo mini plug connector for the audio output cable. Using an incorrect cable may cause a fault or bad connection.**

**- You cannot use both the audio output terminal and the audio output on the plasma display at the same time.**

### 5.2.2. Turning on the power

**Turning on the power to the plasma display also turns on the power to this product.**

**Important**

**- After turning off the power, wait for at least 10 seconds before turning on the power again.**

**Note:**

**- Use the POWER button on the remote control to turn on or off the power to this product.**

**- Setting Display Auto Switched:**

**- When "YES" is selected:**

**Turning on or off the power on the remote control also turns on or off the power to the plasma display.**

**- When "NO" is selected:**

**Turning on or off the power on the remote control does not turn on or off the power to the plasma display.**

# 6. DISASSEMBLY INSTRUCTIONS

**Caution:**

Recommend torque
Screw A~Screw F: 0.49 N·m (5 kgf·cm)
Screw G: 0.29 N·m (3 kgf·cm)

## 6.1. HOW TO REMOVE TOP COVER AND BOTTOM COVER

| | |
|---|---|
| **1. Remove four Screws (A).**<br>**2. Remove Top Cover and Bottom Cover from Main Board.** | |

## 6.2. HOW TO REMOVE HDD (1->2)

| | |
|---|---|
| **1. Remove four Screws (B).**<br>**2. Pull connector for HDD.**<br>**3. Remove four Screws (C).**<br><br>**Note:**<br>**1. When putting Screws (C), attach two Screws *(C) of right figure previously in order to decide position.**<br>**2. Put in Cable between Main Board and HDD as shows in Figure 1.** | |

## 6.3. HOW TO REMOVE MAIN BOARD (1->2->3)

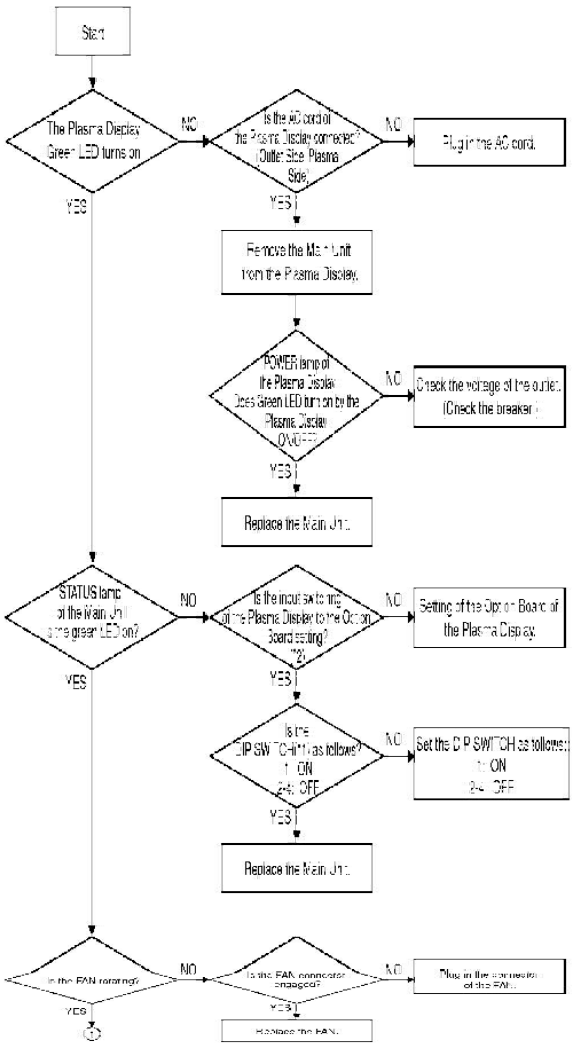
| | |
|---|---|
| **1. Remove three Screws (D).**<br>**2. Remove Angle from Main Board.** | |

## 6.4. HOW TO REMOVE FAN

| | |
|---|---|
| **1. Remove five Screws (E).**<br>**2. Remove two Screws (F).**<br>**3. Pull FAN from Top Cover.**<br><br>**Note:**<br>**When putting a screw, attach correctly in the order of right figure.** | |

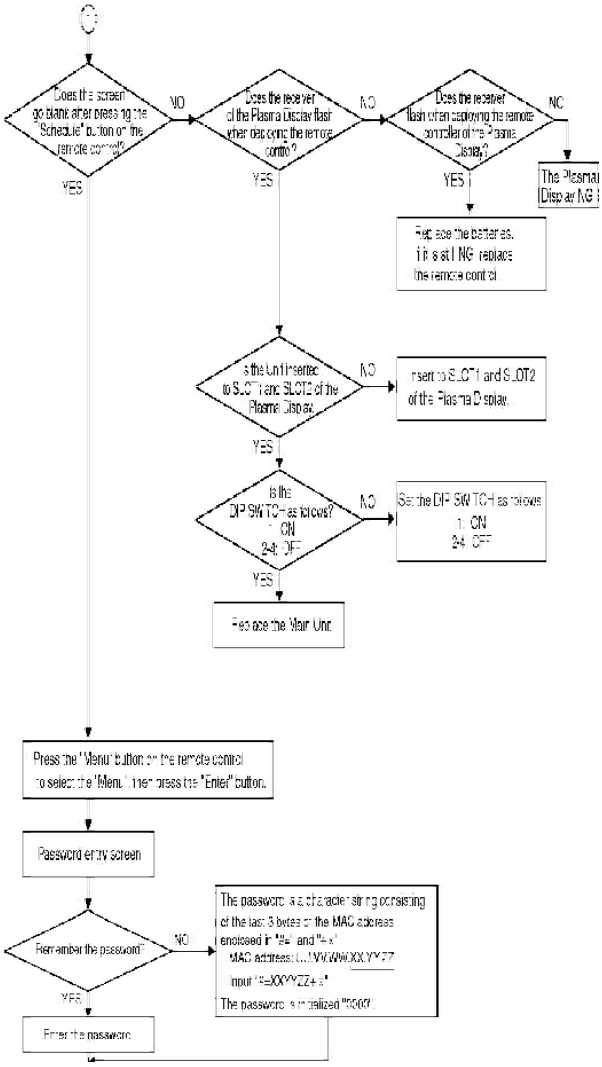
# 7. TROUBLESHOOTING GUIDE

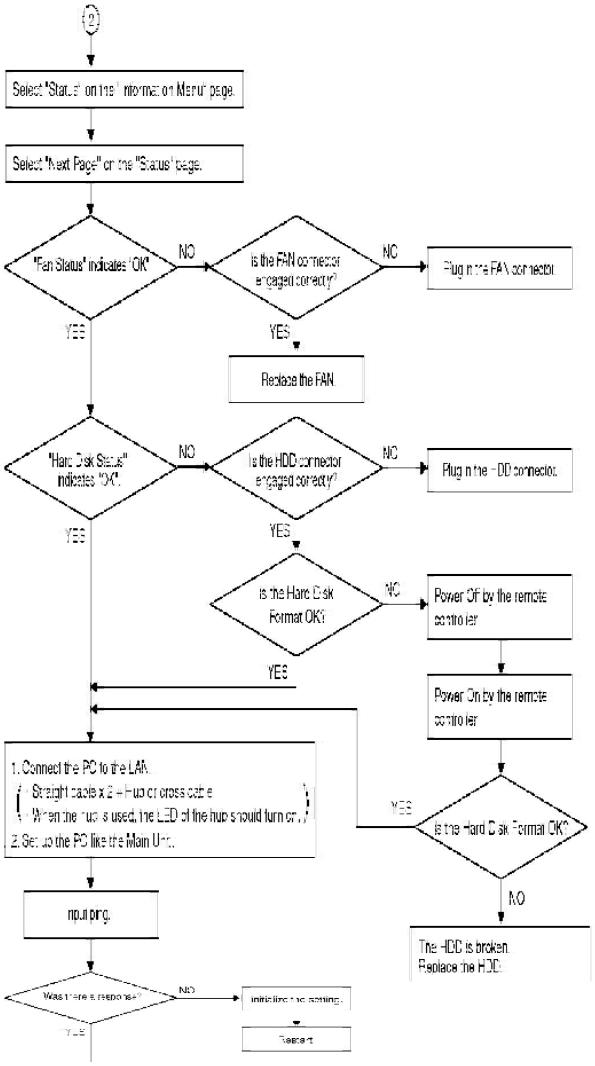
## 7.1. BOOTING OPERATION


Start
The Plasma Display Green LED turns on
NO
Is the AC cord of the Plasma Display connected? (Outlet Side, Plasma Side)
NO
YES
YES
Remove the Main Unit from the Plasma Display.
POWER lamp of the Plasma Display does Green LED turn on by the Plasma Display ON/OFF?
NO
YES
Replace the Main Unit.
STATUS lamp of the Main Unit is the green LED on?
NO
YES
Is the incoming setting of the Plasma Display to the Option Board setting? *2)
NO
YES
Is the DIP SW setting as follows? 1: ON 2-4: OFF
NO
YES
Replace the Main Unit.
Is the FAN rotating?
NO
YES
NO
YES

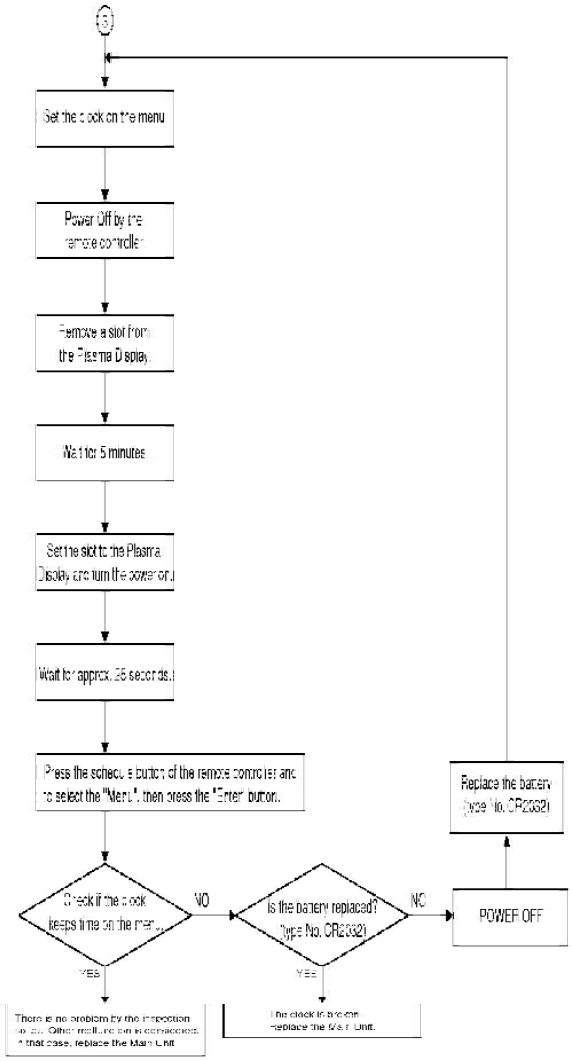
***1 Refer to HOW TO REMOVE TOP COVER AND BOTTOM COVER ().**
***2 Refer to the Service Manual of Plasma Display.**

## 7.2. CONFIRMING THE REMOTE AND HDD OPERATION


Does the screen go blank after pressing the "Schedule" button on the remote control?
NO
Does the receiver of the Plasma Display flash when operating the remote control?
NO
Does the receiver flash when applying the remote controller of the Plasma Display?
NO
YES
YES
YES
Replace the batteries. If it is still NG, replace the remote control.
Is the Unit inserted to SLOT1 and SLOT2 of the Plasma Display.
NO
YES
Is the DIP SW TCH as follows? 1: ON 2-4: OFF
NO
YES
Set the DIP SW TCH as follows 1: ON 2-4: OFF
Replace the Main Unit.
Press the "Menu" button on the remote control to select the "Menu", then press the "Enter" button.
Password entry screen
Remember the password?
NO
YES
The password is a character string consisting of the last 3 bytes of the MAC address enclosed in "#" and "+". MAC address: ...:VV:WW:XX:YY:ZZ input "#=XXYYZZ+#" The password is initialized "0000".
Enter the password.




## 7.3. BATTERY CHECK


Set the clock on the menu
Power Off by the remote controller
Remove a slot from the Plasma Display
Wait for 5 minutes
Set the slot to the Plasma Display and turn the power on
Wait for approx. 25 seconds.
Press the select button of the remote controller and to select the "Menu", then press the "Enter" button.
Check if the clock keeps time on the men...
NO
Is the battery replaced? Type No. CR2032)
NO
POWER OFF
Replace the battery (type No. CR2032)
YES
YES
There is no problem by the inspection up to... Other malfunction is considered. In that case, replace the Main Unit.
The clock is to be replace the M.a.i.n Unit.

# 8. BLOCK DIAGRAM

# 9. CIRCUIT DESCRIPTION

## 9.1. HARDWARE FUNCTION OUTLINE

**- OS:**

**Monta Vista Linux 3.0 (Kernel 2.4.xx)**

**- CPU:**

**PowerPC 405GPr/266MHz**

**- MPEG Decoder:**

**SIGMA DESIGNS EM8476 (Without Macrovision)**

**- Memory:**

**SD-RAM 128MB**

**Flash ROM 512KB for Booting**

**Flash ROM 16MB (upgradable to 32MB)**

SRAM 512KB
- Video Memory:
8MB
- LAN:
10BASE-T/100BASE-TX
- Storage:
HD=20GB approx. (2.5 inches, U-DMA support)
- Peripheral:
Ir (Infrared remote)
- IDE:
ATA100/66 Master
- Serial:
for the internal control (for plasma display control)
- Digital Image Output:
LVDS
- Sound Output:
Internal/External (switchable)
- DIP Switch:
4 pins
- Power Supply:
DC IN 14V /0.7A (supplied from plasma display)
- Others :
Internal clock (RTC)+Battery
Watch dog timer (H/W Watch Doc)
FAN (for HDD cooling)
Battery for SRAM and RTC
- Panel I/F:
STATUS lamp (STATUS)
LAN
Stereo mini jack
- Remote Control:
29 Keys

## 9.2. HARDWARE FUNCTION DETAILS

- CPU
PowerPC405GPr 266MHz
32bit RISC processor core
- DRAM Memory
SDRAM

**The SDRAM is controlled by DRAM controller built in the CPU.**
**Bus width is 32 bits**
**64M bytes x 2 banks**
**4 pieces of NT5SV16M16AT-75B or the equivalent should be used.**

**- Flash ROM for Booting**
**Bus width is 16 bits.**
**The MBM29LV400TC or the equivalent should be used.**
**The capacity is 512 K bytes.**
**(The memory can be upgraded to 1 M byte with MBM29LV800TC.)**

**- Flash ROM for OS**
**Bus width is 16 bits.**
**The capacity is 16 M bytes.**
**A piece of MBM29PL12LM10 is used.**
**(The memory can be upgraded to 32 M bytes with 2 ROMs.)**

**- DIP Switch**
**DIP Switch on the board is provided for the initialization.**
**3 bits of GPIO on CPU is used.**
**GPIO 19 to 21 are connected to the switches 1 to 3.**
**GPIO 16 is connected to the switch 4.**
**Switch ON: GND**
**Switch OFF: VCC**

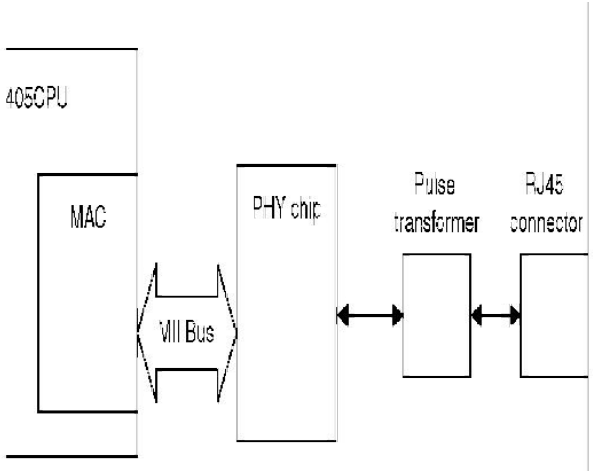
**- STATUS lamp**
**This Status LED is controlled by the software and shows the status.**
**1 bit-GPIO of CPU is used.**
**GPIO1 is connected to the LED.**
**0: The LED is turned ON.**
**1: The LED is turned OFF.**

**- The serial port for the debug**
**The UART built in CPU is used.**
**(The UART is 16550-compatible.)**
**The output signal level is TTL.**

**- Plasma display communication serial port**
**The serial port for plasma display communication**
**The UART built in CPU is used.**
**(The UART is 16550-compatible.)**
**The output signal level is TTL.**

**- 10Base-T/100Base-TX interface**
**The MAC built in CPU is used.**

**The MAC is connected to outside PHY (DP83847) through MII bus.**



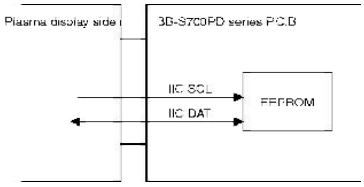

**- EEPROM**

**The function of the function board (BB-S700PD series board) is described in the EEPROM.**

**It is installed on BB-S700PD series board, and read/write function is controlled by plasma display.**

**The capacity is 16 K bytes.**

**24LC16BTI/SN is used.**




**- Battery backup**

**The SRAM and real time clock is backed up by lithium battery.**

**The lithium primary battery (CR2032) is used.**

**- SRAM**

**The SRAM for log saving is connected to the local bus of 405 CPU.**

**The battery backup keeps the written contents.**

**HM62V16256CLTT-5 is used.**

**512 K bytes SRAM**

**16 bits connection**

**- Real Time Clock**

**The real time clock saves the date and time data.**

**It is connected to IIC bus of 405CPU.**

**The clock is back upped by the battery to save the data**

**RS5C372A is used.**

**- DC-DC converter**

**The switching regulator converts the input voltage of 14V into the required voltages of 5 V and 3.3 V.**

**LM2676 is used as the regulator.**

**- Power supply connector for the cooling fan and fan rotation monitoring function**

**The CPU is able to detect the defection of the fan by monitoring its rotation.**

**Power Supply Control**

**The unit is divided into "Main Block" and "Continuous Feed Block", and the PIC for remote receiver is provided to control the DC-DC converter for DC power supply controller.**

**Power ON sequence**

**Plasma Display Power ON from OFF**

**PIC detects 3.3V output voltage of the plasma display.**

**→ The DC-DC converter is turned ON by PIC.**

**→ OS starts booting.**

**Power OFF sequence**

**Remote Power Switch OFF**

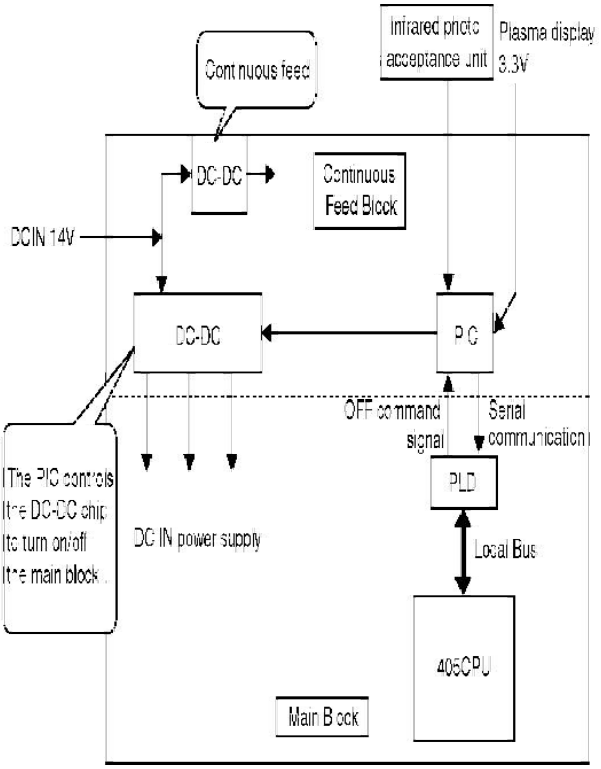
**Power switch OFF code is detected by PIC.**

**→ PIC informs 405 of switch-OFF**

**→ Shut down process by 405**

**→ 405 commands PIC to turn OFF the DC-DC.**

**PIC turns OFF the DC-DC chip.**

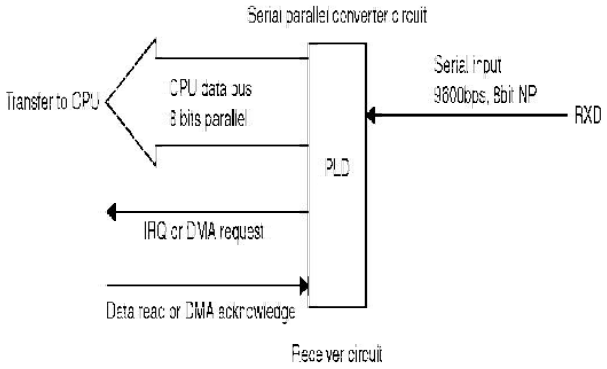



**- Infrared Remote Interface**

**Infrared Remote Interface receives the signal from the infrared remote. The signal received at the infrared photo acceptance unit is converted to RS-232C (the signal level is TTL) in the sub-processor and led to the CPU through the PLD serial receiver circuit.**

**- Serial Receiver Circuit**

**This serial receiver circuit inside PLD receives the serial data from PIC. The input data are sampled by 16-fold receiver clock and the data from the start bit to the eighth bit are input to the shift register. When 8 bits data are completed in the shift register, the interruption request occurs. The interruption is released by data reading.**

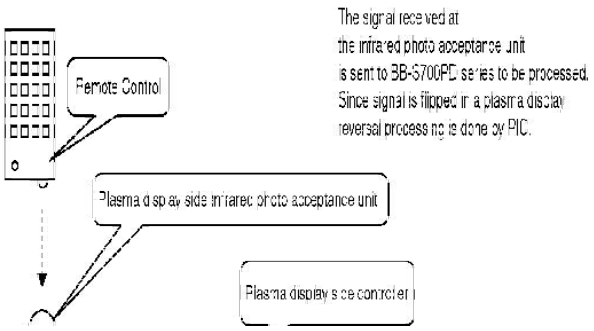



**Receiver Control (the interruption during transferring)**

**When the receiver buffer receives the data on the condition that SIF_RES of system register 0 is set to "1", the interruption into CPU occurs.**

**The interruption is released by reading the serial receiver register.**

**Remote Controlling**


Remote Control
The signal received at
the infrared photo acceptance unit
is sent to BB-S700PD series to be processed.
Since signal is flipped in a plasma display
reversal process not is done by PIC.
Plasma display side infrared photo acceptance unit
Plasma display side controller

**- HDD Interface**

**Interface for the HDD connection**

**PCI-ATA bridge chip HPT371N is used, which is connected to CPU through the PCI Bus.**

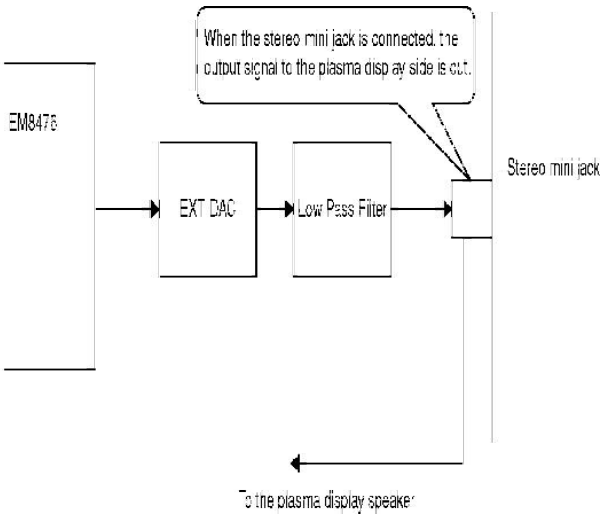
**- MPEG decoder Chip**

**MPEG hardware decoder EM8476 is used, which is connected to CPU through the PCI Bus.**

**- Analog Audio Output**

## Stereo sound outputs from MPEG decoder chip.

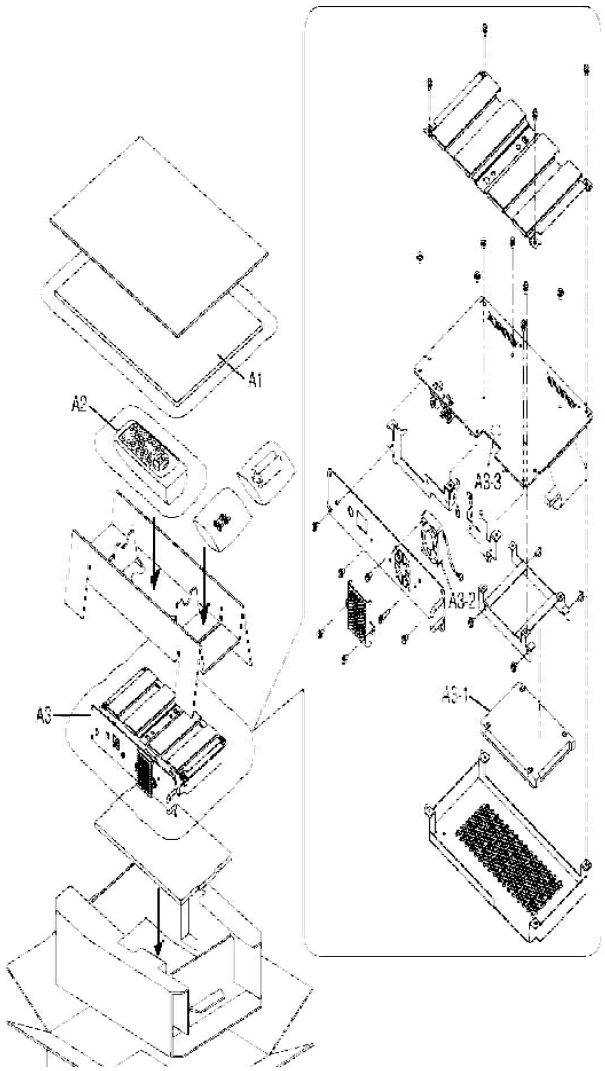
**Slot type-Stereo mini jack.**
**When the stereo mini jack is connected, the internal speaker is turned OFF.**


When the stereo mini jack is connected, the
output signal to the plasma display side is cut.
EM8476
EXT DAC
Low Pass Filter
Stereo mini jack
To the plasma display speaker

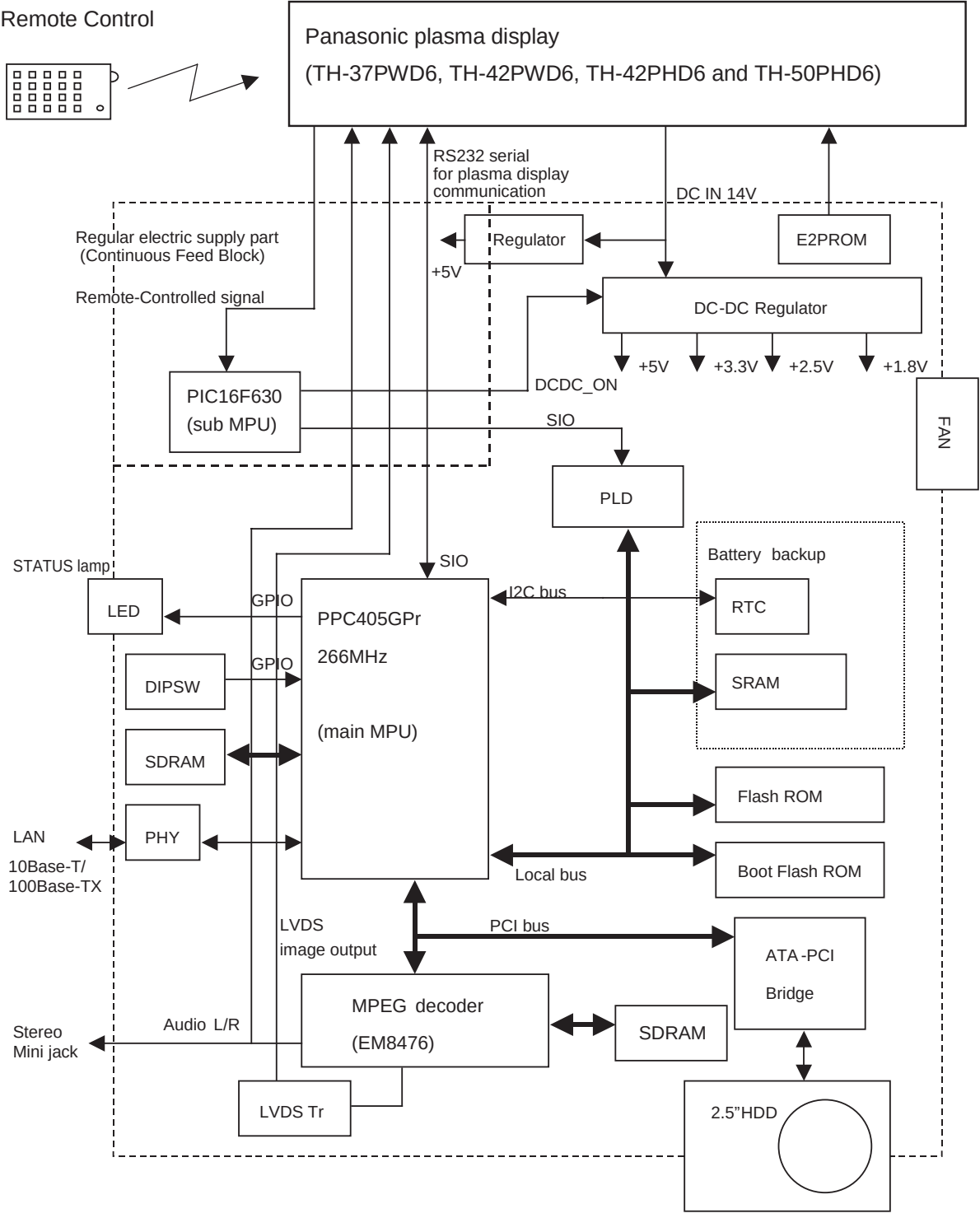
## - Digital Image Output

**Digital image is output to plasma display.**
**The digital RGB from EM8476 is output after being converted through LVDS transmitter.**

# 10. ACCESSORIES AND PACKING MATERIALS




## A / BBS700PDA / BBS700PDE




BB-S700PD series BLOCK DIAGRAM